Three-Stent Placement for Treatment of Carotid Artery Pseudoaneurysm

A Case Report

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Summary

Pseudoaneurysm treatment with overlapping stents may be a useful technique to reduce flow and enhance thrombosis in the aneurysmal sac. We treated a pseudoaneurysm of the left carotid artery in a patient with a history of bilateral carotid thromboendarterectomy by placing three stents and overlapping them at the level of the aneurysmal neck.

Nine month follow-up revealed almost complete pseudoaneurysm exclusion and patency of the carotid artery.

Introduction

Before the advent of endovascular treatment, surgical or medical therapies were the two options for treatment of dissection and pseudoaneurysm of the carotid artery [1-2]. The application of covered and uncovered stents or of uncovered stent associated with coil embolization [3-5] has been employed in recent years to treat pseudoaneurysm. A few articles have so far reported on the use of multiple stents in the treatment of carotid pseudoaneurysms, all with good results [2,6]. The following case report illustrates the treatment of a pseudoaneurysm in a stenotic carotid artery using three overlapping segmented nitinol stents.

Case Report

A 73-year-old man who had undergone bilateral carotid endarterectomy several years ago presented with an anomalous pulsating mass in the left side of the neck combined with a systolic murmur.

His Color Doppler Ultrasound (US) and Angio-CT scan revealed a left carotid pseudoaneurysm. Anti-leukocyte antibody immunoscintigraphy excluded an infectious cause. Digital subtraction angiography revealed two dilations of the extracranial internal carotid, the first, caudal, fusiform that seemed post-surgical dilatation and the second, cranial, eccentric that seemed located at the distal anastomosis site therefore suggesting failure of anastomosis. There was a shrinking between dilations with an arterial substenosis and a kinking immediately above the upper pseudoaneurysm. The carotid artery also had a tortuous shape (figure 1).

Because of the high anesthesiologic risk of the patient, the surgeon excluded surgical treatment of the lesion.

Therefore, we decided to treat the pseudoaneurysm by placing uncovered stents with or without coil embolization trough the mesh of the stent.

An antiaggregant treatment (cardioaspirin 250 mg/die and clopidogrel 75 mg/die) was ad-

ministered for three days before the procedure. After signed consent was obtained, the patient was brought to the angiography suite. Under local anaesthesia and with constant monitoring during the procedure by the anaesthetist, we placed an 8-Fr guiding catheter (Vistabrite VBL-Cordis) into the left common carotid artery proximal to the pseudoaneurysm. Heparin (2000 U.I.) was administered to the patient with ACT control. Using a 0.014-inch guide Choice PT microwire (Boston- Scientific), we went beyond the lesion with no problem and placed the first stent (Precise RX (Cordis) 7 x 40) in the middle part obtaining partial coverage of both dilatations, stenosis disappearance and a mild kinking rectification without a substantial alteration of the vessel anatomy. Afterwards, we placed another two stents, one (Precise RX (Cordis) 7 x 30) in the upper part and the other (Precise RX (Cordis) 8 x 20) in the lower part of the lesion, partially overlapping them with the first stent combined with the pseudoaneurysmal neck and completely covering the pseudoaneurysm with good adherence of the stents one with another and of the three stents with the arterial wall.

Control angiography performed after placement of the three stents showed a reduction in size of the pseudoaneurysm, a good shape of the carotid axis without kinking and in the late-phase images some stagnation of contrast medium in the pseudoaneurysmal sac (figure 1). In addition, the patient reported an attenuation of the left side mass effect of the neck. For these reasons we decided to stop the treatment, follow up the patient and if necessary do the coil embolization we had planned on a later occasion. The last control angiography at the end of the procedure revealed a patent carotid artery and good coverage of the aneurysmal neck by the stents.

During the procedure neither technical complications nor neurological sequelae were observed, and the post interventional course was regular.

The patient was discharged two days after his admission to the hospital in good health. An anti-thrombosis drug was recommended in addition to the usual therapy.

The carotid Color Doppler US and the Angio-CT performed three and nine months later confirmed the almost complete pseudoaneurysm exclusion with no flow in the aneurysmal sac and the carotid artery patency (figure 2)

Discussion

The initial result of this case shows that the use of multiple overlapping stents may be a good alternative in the therapy of complex pseudoaneurysm of the carotid artery.

Our first aim was to treat the pseudoaneurysm and carotid stenosis preserving vessel anatomy in a carotid artery with an abrupt transition in size between extremes of the lesion. Therefore we decided to place three stents choosing the size with regard to the different arterial diameters so that there might be good adherence of stents one with another and with the carotid wall and good flexibility. The segmented stents would allow us to do coil embolization through the mesh in spite of partial overlap. As described before, after control angiography we decided to stop treatment because of the good result obtained only with overlapping stents.

The first endovascular option in the treatment of carotid artery pseudoaneurysm should have been stent-graft placement. In our case we needed a device with good conformability, flexibility and wall apposition because of kinking of the vessel and its tortousity. We prefered not to place a stent-graft because of the poor flexibility of many devices and the short deployment system of the flexible ones. Stent-graft wall apposition is also limited when one has to treat lesions with wide diameter differences between extremes. There are reports in the literature of several disadvantages, such as high thrombogenicity[2,4] with the risk of a carotid occlusion.

With uncovered stents, the best aneurysmal neck sealing may be obtained by a narrow mesh wire stent. However, this device has a significant foreshortening at stent release with probably no precise placement. Moreover, it is not as suitable as a segmented stent for management of vascular regions with abrupt transitions in size, as is the case with the lesion we treated. For these reasons, we chose to place three segmented stents and not a stent-graft or a mesh wire stent.

The other options we considered in treatment of the pseudoaneurysm were carotid occlusion and coil embolization without stent placement. Carotid occlusion was excluded because of the vasculopathic condition of the patient and the probable poor compensation of the cerebral circulation by the other arteries.

Figure 1 Images obtained in frontal view before (A,B) and after (C,D) stents placement. In the frontal view the pseudoaneurysm is visible with its fusiform (arrow head) and eccentric shape (*). The stenosis (arrow) between the two lesions is also visible (A). After placement of three stents the control angiography shows a patent carotid artery with good preservation of vessel anatomy, aneurysmal flow reduction (C,D) and, in a late phase, a stagnation of contrast medium inside the lesion (D).

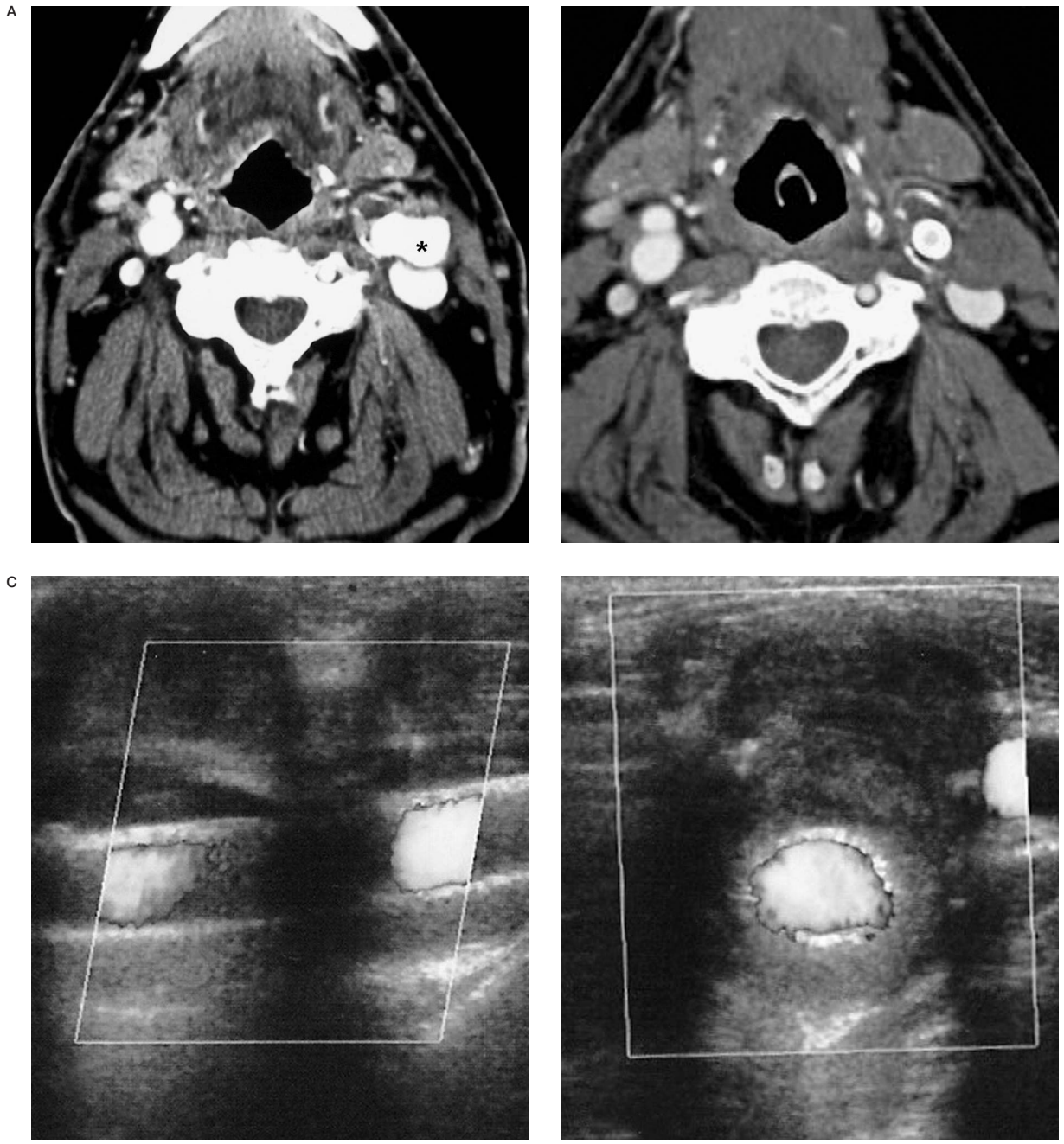

Figure 2 CT angiography before stents placement (A) shows the carotid artery pseudoaneurysm (*) with compression on the jugular vein. After placement of three stents there is complete exclusion of the pseudoaneurysm (B) with no flow inside the sac, which is also apparent in the late phase. Color Doppler US performed three months after treatment (C,D) shows a patent carotid artery and almost complete pseudoaneurysm exclusion.

Coil embolization alone was impracticable in this case because of the inevitable incomplete treatment of fusiform pseudoaneurysm and the risk of spiral migration into the parental vessel from it. Because we also needed to treat a carotid artery stenosis between the two dilations, the use of coil embolization alone was an insufficient solution.

With regard to multiple stent placement, other articles have discussed this technique as a

vessel patency preserving alternative therapy for dissection or pseudoaneurysms [2,6]. The aim of overlapping stents is to reduce porosity and to significantly impede intra-aneurysmal blood flow, thereby accelerating blood stasis and aneurysmal thrombosis. In our treatment decision, we also took into account some recent articles that have described a high risk of stent fractures in multiple stents superposition, mainly in multiple stenting of the superficial femoral artery. In this case we estimated a very low fracture risk. In fact, we placed the stents in a region that is very different from the leg subjected to forces, such as external compression, torsion, elongation and flexion that are minor compared with those in the thigh. We treated a patient with a short neck who, because of his old age, has reduced activity.

At the moment however we are not able to say if neck or head movements are generally of any concern in such a technique. In any case we have already treated carotid stenosis, mainly long post-attinic stenosis, with overlapping stenting and we have had no more problems than with single carotid stenting also with regard to restenosis.

The treatment of carotid artery lesion by this procedure currently appears safe and effective [2,6].

We conclude, in agreement with other authors, that placement of multiple overlapping stents may be a very good alternative in carotid pseudoaneurysm treatment.

More cases with long-term follow-up are needed to determine the potential role of this technique as a routine therapy.

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